

Occurrence and distribution of established and new introduced bird species in north Sulawesi, Indonesia

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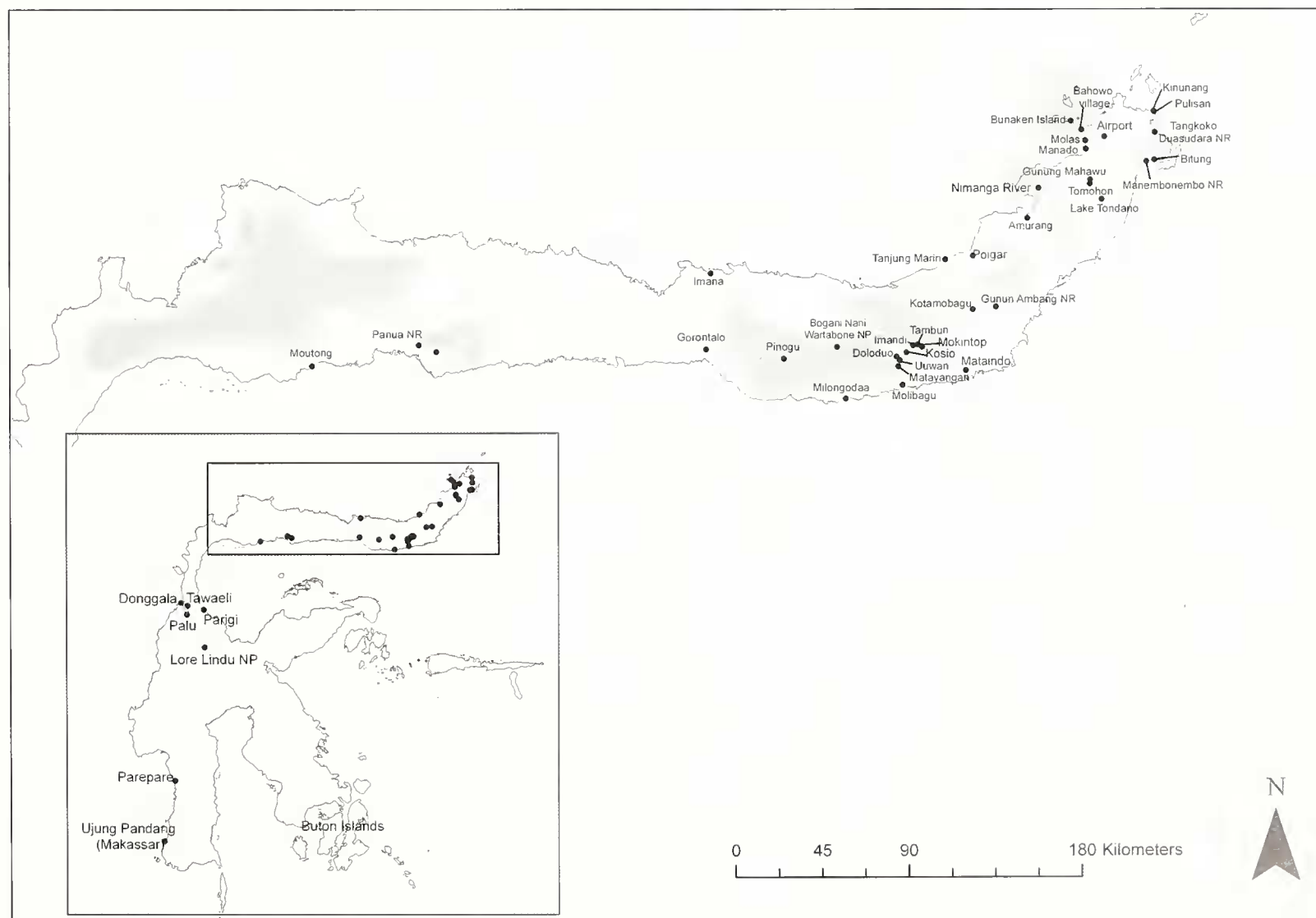
Distributional and habitat information on eight introduced bird species in north Sulawesi, Indonesia, is presented. The accounts are based on our observations as well as being gathered from published sources and unpublished trip reports. Three species (Sulphur-crested Cockatoo *Cacatua galerita*, Sooty-headed Bulbul *Pycnonotus aurigaster* and Red-collared Dove *Streptopelia tranquebarica*) have not previously been reported in north Sulawesi in the published literature, while the continued presence and status of Java Sparrow *Padda oryzivora*, Zebra Dove *Geopelia striata* and Rock Dove *Columba livia* was considered uncertain in the published literature. Further work is required systematically to document the distribution, status and spread of introduced species in the north and other parts of Sulawesi—an imperative from both an economic and conservation perspective.

INTRODUCTION

The distribution of introduced bird species often receives less attention than native and particularly rare or endemic species (White & Bruce 1986, Eguchi & Amano 2004, Yap & Sodhi 2004, Antos *et al.* 2006). However, introduced species can potentially have a range of negative ecological impacts (e.g. competition, etc.), and recording changes in known distribution can indicate rates or means of establishment or spread (Long 1981, Brook 2004, Lever 2005). Here we provide further distributional information for eight species of introduced birds on the Minahassa Peninsula, north Sulawesi, Indonesia. The Minahassa Peninsula is the longest of Sulawesi’s four peninsulas that contribute to the island’s distinctive

shape (Figure 1). This distributional information is based on our observations and on comparisons with major recent published works for the island (White & Bruce 1986, Holmes & Phillipps 1996, Coates & Bishop 1997, Strange 2001), monographs (e.g. *Handbook of the birds of the world* series), published journal articles and unpublished trip reports. Our observations were made between 1990 and 2010 (MA) while travelling extensively in north Sulawesi (roughly between Manado and Gorontalo) and 12–23 July 2009 (JAF and JLT) while travelling between sites on the northern peninsula of Sulawesi including Manado, Tangkoko Duasudara Nature Reserve, Tomohon and surrounds, Bogani Nani Wartabone National Park and Bunaken Island. The locations of place names used in this paper are shown in Figure 1.

Figure 1. Locations in Sulawesi described in this paper (protected areas are represented by grey shading; NR = nature reserve; NP = national park).



SPECIES ACCOUNTS

Species not previously recorded in north Sulawesi in the published literature

Sooty-headed Bulbul *Pycnonotus aurigaster*

Sooty-headed Bulbul is native to China, Burma, Indochina, Thailand, Java and Bali, but has been introduced to a number of islands in Indonesia, thought to be the result of escaped cagebirds (e.g. Coates & Bishop 1997, Strange 2001), although Yap & Sodhi (2004) suggest the mode of colonisation for this species in South-East Asia is unknown.

Coates & Bishop (1997: 406) stated that this species occurs in south Sulawesi, north to Enrekanga (at the northern end of the southern peninsula). Strange (2001) listed the species as occurring in 'south Sulawesi' and maps its distribution in the southern peninsula. Holmes & Phillipps (1996: 52) noted that the Sooty-headed Bulbul and Yellow-vented Bulbul *Pycnonotus goiavier* 'have been introduced into South Sulawesi where they occur widely', while MacKinnon & Phillipps (1993) also suggested their introduction has been restricted to the south of the island. White & Bruce (1986) cited Coomans de Ruiter & Maurenbrecher's (1948) assessment of this species becoming a 'well established urban dweller at Ujung Pandang' in the south, but cite no other records. Fishpool & Tobias (2005), in the most recent review of the entire distribution of the species, stated its presence in Sulawesi was restricted to the south.

MA believes this species to have been present in north Sulawesi from at least 1990 (at least in parts of Manado). Specific observations include several tens at Bahowo village (coast north of Manado) on 30 July 2006, up to three at Pulisan between 12 and 14 August 2006 and several tens at the same location on 14 March 2008, several tens at Hotel Santika, Tongkeina (Manado), on 8 March 2008, three at Tanjung Mariri, north coast, 12 km east of Inobonto, on 14 March 2008, and several tens on the track up to Gunung Mahawu on 25 June 2008. In February 2010, birds were observed collecting nest material (grasses) on a daily basis in Manado, and a single bird was observed between Manado and Tomohon. In March 2010 specific attention was paid to the occurrence of this species along the north coast between Tumpaan and Inobonto. Birds were observed 20 and 7 km east of Poigar (one, 19 March), near Tanjung Mariri (three, 19 March) and nearby in Nonapan Baru (one, 27 March). Additional observations inland were made at the Nimanga River near Munte (one, 27 March), and 1 km south of Manado airport (three, 28 March). No observations were made further west at Kotamobagu, or further west to Gorontalo despite more than 20 trips there.

JAF and JLT observed small groups of this species in at least four separate localities on the Minahassa Peninsula of north Sulawesi—in central Manado on 12 July 2009, Tangkoko Duasudara Nature Reserve on 15 July 2009, near the north eastern edge of Lake Tondano on 15 July 2009 and outskirts of Manado near the Sam Ratulangi International Airport on 23 July 2009.

In addition to our observations, Sooty-headed Bulbul has been recorded in the Minahassa Peninsula in a number of unpublished trip reports, it seems as far back as 1997, specifically at Manado (e.g. Lujendijk 1997, Farrow 2006, Morris & Demeulemeester 2007, J. W. Duckworth in Robson 2007), Tangkoko Duasudara Nature Reserve (e.g. Ahlman 1999, Gregory & Maher 2000, Myers 2001, Cooper & Cooper 2002, Morris & Demeulemeester 2007, Farrow 2008), and between Manado and Bogani Nani Wartabone National Park (Cooper & Cooper 2002).

It would thus appear this species is almost certainly established in parts of the Minahassa Peninsula and could be locally common (see also Farrow 2010). The lack of records from central Sulawesi suggests it is likely that these north Sulawesi populations are the result of locally escaped birds rather than a spread from the south of the island. However, observations from areas between the western Minahassa Peninsula and the south-west of the island are required

to determine the occurrence (or lack thereof) of intervening populations; for example, Cooper & Cooper (2002) also found Sooty-headed Bulbul between Palu and Lore Lindu National Park.

Sulphur-crested Cockatoo *Cacatua galerita*

Two Sulphur-crested Cockatoos *Cacatua galerita* were seen by JAF, JLT and a guide perched quietly in trees in lowland rainforest in Tangkoko Duasudara Nature Reserve at 11h00 on 14 July 2009. The pair was observed for a couple of minutes before flying and calling. One bird was located a few minutes later about 100 m away and was observed through binoculars and photographed in the mid-upper canopy (~20 m up) for five minutes before flying off.

The cockatoos were identified from the closely related Critically Endangered native Yellow-crested Cockatoo *C. sulphurea* by their large size, relative size of the crest, and lack of yellow ear-coverts (see Coates & Bishop 1997, Rowley 1997, Forshaw 2006). The cockatoos had a clearly visible pale blue eye-ring, suggesting they were most likely of the subspecies *leonora* (but possibly also *triton*). Both observers are familiar with this species from Australia.

The nearest native population of Sulphur-crested Cockatoos are in Papua (subsp. *triton*) and the Aru Islands (subsp. *leonara*), some 650 km and 1,250 km away, respectively. None of the major texts (White & Bruce 1986, Holmes & Phillipps 1996, Coates & Bishop 1997, Rowley 1997, Strange 2001, Forshaw 2006) notes Sulphur-crested Cockatoo as occurring on Sulawesi. Coates & Bishop (1997) considered that where Sulphur-crested Cockatoos have been recorded elsewhere in Wallacea they have been introduced. The subspecies *leonora* (and possibly *triton*) has been recorded on Ambon, Seram Laut Islands (Manawoka, Gorong) and Kai Island, where it is 'recently introduced [and] possibly established' (Coates & Bishop 1997: 337). Feral birds or escapes are occasionally observed elsewhere in Wallacea but their status is considered unknown (Coates & Bishop 1997).

Sulphur-crested Cockatoos are an illegally but commonly traded species in Indonesia (White & Bruce 1986, Shepherd 2005, 2006, ProFauna Indonesia 2008), with trade between Papua and the Philippines. North Sulawesi, and particularly the coastal port of Bitung near Tangkoko Duasudara Nature Reserve, is part of this smuggling/trade route (I. Hunowu and J. Tasirin, Wildlife Conservation Society, pers. comm. 2009). It is thus highly likely the cockatoos observed in Tangkoko are escaped or released cagebirds, as (it is suspected) are records of an Eclectus Parrot *Eclectus roratus* at Tangkoko in 2003, a species native to the Moluccas (I. Hunowu pers. comm. 2009) and reports from rangers of a White Cockatoo *Cacatua alba* in the same reserve (P. Gregory pers. comm. 2010).

Rowley (1997) stated that Sulphur-crested Cockatoos released from captivity can rapidly establish populations. If this species were to establish itself in Tangkoko or other parts of Sulawesi it raises a number of interesting questions. The ecological similarity between *C. galerita* and *C. sulphurea* means there is potential for competition if they overlap—indeed Schliebusch & Schliebusch (2001) suggest they are conspecific. However, while Yellow-crested Cockatoos formerly occurred across Sulawesi, they are now believed to be close to extinction (Rowley 1997, Snyder *et al.* 2000) and most likely extinct in Tangkoko and other parts of the north (Coates & Bishop 1997, BirdLife International 2001). Indeed rangers at Tangkoko were very excited on observing and/or viewing the photographs of the pair, with one suggesting he had not seen a cockatoo in seven years of working in the reserve. Thus there is potential for Sulphur-crested Cockatoos to take over the ecological niche vacated by the massive declines and local extinctions of Yellow-crested Cockatoos.

Interestingly, there have also been a number of recent reports of Yellow-crested Cockatoos in Tangkoko (Farrow & Robson 2009, Hutchinson 2009a, 2009b, Gregory 2010), including one seen at close quarters (P. Gregory pers. comm. 2010), although Farrow

(2010) reassigned his 2009 observation to Sulphur-crested based on closer observations of a pair in 2010 and the presence of pale blue eye-rings on these birds. Considering the presence of a number of species of obviously introduced parrots, the origin of these recently observed Yellow-crested Cockatoos is unclear but could also be the result of cage escapes/release. On viewing photographs of the cockatoo we had observed, the observers above agreed that it was a Sulphur-crested Cockatoo, and thus visitors to the reserve should be mindful of the potential presence of a number of similar cockatoo species.

Red-collared Dove *Streptopelia tranquebarica*

Red-collared Dove was first found in Sulawesi in 1978 (Escott & Holmes 1980), and according to Coates & Bishop (1997: 313) is known only in north-central Sulawesi 'from the Palu Valley and north to the vicinity of Tawaeli, and also near Parigi'. Holmes & Phillipps (1996) and White & Bruce (1986) both suggested that the occurrence of this species is restricted to the central region of Sulawesi. However, more recent reports suggest the range of this species may be expanding. For example, Bishop (1999) has since observed four birds between Moutong and Gorontalo on the Minahassa Peninsula, Lagerqvist (2006) found two birds between Doloduo and Tambun, De Win (2010) found them not only near Lore Lindu but en route to Manado, while Hutchinson (2010) observed them in ricefields between Manado and Kotamobagu. Small numbers have also recently been observed around fishponds in Makassar on the south of the island (Farrow 2007, 2008, 2010, Morris & Demeulemeester 2007). Interestingly, in the information centre of Tangkoko Duasudara Nature Reserve the species is illustrated as occurring in that reserve.

Species whose status was previously considered uncertain in north Sulawesi

Java Sparrow *Padda oryzivora*

Although Java Sparrows *Padda oryzivora* have for some years been considered Vulnerable in their native Java (BirdLife International 2001), escapes have established feral populations in a number South-East Asian countries where they have become pests of rice crops (Yap & Sodhi 2004), including parts of southern Sulawesi (Whitten *et al.* 2002).

Meyer & Wiglesworth (1898: 543) found Java Sparrow to be 'common near Macassa, but rare in the north, where it has only been found by Meyer near Manado'. These observations from the late nineteenth century contradict the statements in Whitten *et al.* (2002: 585) that the species 'was probably introduced into Sulawesi in the last couple of decades' and in Lever (2005: 247) that 'Java Sparrows seem to have been first reported on Sulawesi, on the southern peninsula and on the eastern end of the northern Minahassa Peninsula, by Stresemann (1936)...'. White & Bruce (1986) cited Meyer & Wiglesworth's (1898) observation near Manado but provide no other records from north Sulawesi, as did Stresemann & Heinrich (1941). Coates & Bishop (1997: 499) suggested the species is 'uncommon and local in the south, but locally common, north to Parepare and the head of Teluk Bone'. They also stated it is 'also recorded [in] Manado' but that its status in this region is unknown. It is not clear whether Coates & Bishop's (1997) reference to the Manado record(s) is sourced from White & Bruce (1986) and ultimately Meyer & Wiglesworth (1898). Holmes & Phillipps (1996: 67) stated the species has been 'introduced into south Sulawesi, but it is now rare'. Andrew & Holmes (1990) did not report any records of this species from the north. Strange (2001) reports the Java Sparrow to be introduced but generally scarce on Sulawesi (and a number of other Indonesian islands) but does not provide any more specific location information.

MA observed a single Java Sparrow on 23 October 1990 at Molas (Nusantara Dive Centre, north of Manado), a single bird at

Purworedjo (some 15 km south-east of Kotamobagu) on 21 September 1993, and a single bird at Gorontalo on 16 July 2000. Approximately seven Java Sparrows were observed by JAF at around 08h30 on 12 July 2009 on building scaffolding about 15 m high on a newly constructed building on Jl. Piere Tendean, on the coastal strip of central Manado.

Our observations, combined with sightings by Gregory & Ford (2006) of a flock of at least 150 in the paddies at Posko, by Farrow (2008) of a 'couple of birds' at Amurang (possibly the same location of observations in Hutchinson [2008a, 2010] and Farrow & Robson [2009]), by Hutchinson (2009b) of 'flocks' on locations between Manado and Kotamobagu, by De Win (2010) of two birds en route to Gunung Ambang, and by Hutchinson (2008b) of several 'nesting under the eaves of a roadside house' between Tangkoko and Manado Airport, indicate that small resident populations exist near human settlements in north Sulawesi, although the absence of sightings from most 'trip reports' suggests they are not common.

Zebra Dove *Geopelia striata*

Coates & Bishop (1997: 317) stated that the Zebra Dove *Geopelia striata* is 'apparently feral on Sulawesi' but provided no further distributional information. Strange (2001) suggested that the species is introduced to Sulawesi, although he did not map its distribution on the island as he had for other introduced species to Sulawesi. Holmes & Phillipps (1996) provided little detail except to note that Zebra Dove is present on Sulawesi and does not appear to be restricted to any particular region. Meyer & Wiglesworth's (1898: 648) historical account of this species's distribution provides more information when stating it is 'very common in flocks on the fields in South Celebes; in the North of the island it is unknown'. Escott & Holmes (1980) were apparently the first to document the species's presence in the north (at Gorontalo), suggesting it had previously only been recorded in the south and south-central regions. Intriguing and somewhat contradictory is the statement by Gibbs *et al.* (2001: 313) that it is 'local in Sulawesi (mostly in the north)' although they mapped the species as occurring across the entire island.

MA observed a single Zebra Dove on 28 July 1991 at Imana, some 20 km east of Kwandang on the north coast. Few records of Zebra Dove appear in recent trip reports, indicating the species is uncommon and not widespread in north Sulawesi (although see Milton's [2008] record from Manado and a record by Hutchinson [2009b], location not specified). Gregory (2010) found 'amazingly few, just singles near Tangkoko and Toraut', and in the information centre at Tangkoko Duasudara Nature Reserve the species is illustrated as occurring there.

Rock Dove *Columba livia*

Rock Dove is one of the most successful introduced species in the world. Coates & Bishop (1997: 312) suggested that it is 'present in most towns in Wallacea' but 'only recently established as a feral species'. White & Bruce (1986) noted Rock Dove as occurring in south Sulawesi but that 'White had no records of feral birds for Wallacea'. White & Bruce (1986: 186) further stated: 'There are a few recent observations from South Sulawesi (McKean 1982, J Klapste [pers. comm.])' and that 'These pigeons are often seen in towns throughout Wallacea (cf Watling 1983), but the distribution of feral birds is poorly understood, as with other introduced species'. Holmes & Phillipps (1996) also indicated this species as having been recorded only in the south of Sulawesi.

JAF and JLT recorded a single bird in Manado flying to a building ledge on 12 July 2009 and three birds on the roof of a shed in paddy fields north of Lake Tondano on 15 July 2009.

Elsewhere, Morris & Demeulemeester (2007) found Rock Doves in several towns and suggested many were kept as pets. This somewhat corresponds with Watling's (1983: 253) observations from mostly central Sulawesi of the species 'kept in a semi-domesticated form in

many villages', but that no wild nesting populations were observed. However, Gregory & Maher (2000) and Gregory (2010) observed 'presumed feral birds' at Kotamobagu. Lagerqvist (2006) saw Rock Doves 'in small to moderate numbers in most populated areas' in Sulawesi, while Farrow (2006) also recorded them several times. In the information centre of Tangkoko Duasudara Nature Reserve the species is illustrated as occurring in that reserve.

Species well known to be established

Spotted Dove *Streptopelia chinensis*

Thought to be introduced to Sulawesi in 1835, Spotted Dove is now widespread in Wallacea, where it appears to be expanding its range (Coates & Bishop 1997). Strange (2001) mapped its Sulawesi range as the entire island. Holmes & Phillipps (1996) considered it common and widely distributed in open country. White & Bruce (1986) cited Meyer (1879) as giving the date of introduction as 1839, although this changed to 1835 in Meyer & Wiglesworth (1898). That White & Bruce (1986) also stated the species to be 'recently recorded from Central and SE Sulawesi' (citing Holmes & Wood 1980, McKean 1982, Watling 1983) suggests that the north was where the species first became established on the island. This is supported by Meyer & Wiglesworth (1898), who found the species to be common (at least in the north) and Riley (1924), who reported a 'good series of both sexes' from a number of localities in the north and central regions between 1914 and 1918.

MA records Spotted Dove as being widespread and relatively common in north Sulawesi, particularly in rural areas and towns but not in the forest. Specific localities recorded include Matayangan (two on 2 December 1990), Tambun village (six on 7 December 1990), the Pinogu enclave of Bogani Nani Wartabone National Park (six on 22 July 1991), Molibagu (one on 7 August 2006), Tambun (three on 9 August 2006), and Kinunang (Pulisan) (two on 12 August 2006).

Recent trip reports often mention small numbers of Spotted Doves seen in open habitats (Gregory & Maher 2000, Farrow 2006, 2007, 2008, 2010, Gregory 2010), especially in the Manado/Tangkoko areas (Morris & Demeulemeester 2007), although Bishop (1999) suggested they are common in dry, coastal scrub, farmland, edge of rice-fields and areas near human habitation throughout Sulawesi.

Spotted Doves have also been recorded in agricultural land and secondary forest in a number of protected areas, e.g. Manembonembo, Panua, Gunun Ambang and Tangkoko Duasudara Nature Reserves and Bogani Nani Wartabone National Park (Rozendaal & Dekker 1989, Bororing *et al.* 2000, Riley & Mole 2001, Riley *et al.* 2003, Lagerqvist 2006).

Eurasian Tree Sparrow *Passer montanus*

Coates & Bishop (1997) suggested that Eurasian Tree Sparrow has only relatively recently become established in north and north-central Sulawesi (in 1979) following Escott & Holmes's (1980) statement that the 'spread of the introduced Tree Sparrow around Sulawesi is to be expected and it is now known from Manado in North Sulawesi and Donggala, the port of Palu, in Central Sulawesi'. White & Bruce (1986) suggested it is now found in various parts of north, central, and south Sulawesi. Holmes & Phillipps (1996) suspected that the Eurasian Tree Sparrow arrived on Sulawesi via ships and, with Strange (2001), stated that it is now common in many towns and settlements. Summers-Smith (2009) showed the distribution of this species as the entire island of Sulawesi, but did not suggest it is introduced.

Rozendaal & Dekker (1989) noted that the observation of a single bird at Doloduo on 9 December 1985 was the only record on the west side of the Dumoga Valley at the time and that the species was common in Manado, Tomohon and Kotamobagu. However, MA's observations clearly show the spread of the Eurasian Tree

Sparrow in a westerly direction into the Dumoga Valley (Kosio, Uuwan, Imandi, Mokintop), and even along the south coast (Milongodaa, Mataindo), while Sutton (1997) found them to be 'common around Dumoga Bone N.P.'. MA made the following observations: 22 October 1990, Manado, 'very common'; 5 November 1990, Kosio, Dumoga Valley (numbers not recorded); 15 November 1990, between Duloduo and Molibagu, village Uuwan, 10, probably more; 19 November 1990, Manado, 'daily', no numbers; 4 December 1990, Imandi, Dumoga Valley, one juvenile, roadkill, c.3 weeks old; 17 April 1991, Mokintop, near Tambun, one adult caught and eaten by Purple-winged Roller *Coracias temminckii* (see Argelloo & Fitzsimons 2011); 22–23 July 1991, Pinogu enclave, no Tree Sparrows observed; 3 August 1991, 'tens' at Milongodaa (south coast national park); 9 March 2007, tens at Santika Hotel, Manado, breeding in holes of palms and cottages in February 2010; and several tens along the south coast in Mataindo (20 March 2010). JAF and JLT found the species to be common in most areas of human habitation and agricultural areas in July 2009 (e.g. Manado, Tangkoko, Lake Tondano, Bunaken Island).

Riley *et al.* (2003) recorded the species in agricultural land in Panua Nature Reserve, while Bororing *et al.* (2000) found it in villages within Manembonembo Nature Reserve. Most trip reports do not specifically list localities for Eurasian Tree Sparrow although the summary by Bishop (1999)—'ubiquitous except within forest'—provides a representative summary of records from this forum.

DISCUSSION

This paper documents the distribution and occurrence of introduced bird species (a) that have not previously been recorded as occurring in north Sulawesi in the published literature, (b) whose status was previously considered uncertain and (c) already known to be well established. Of the birds in the first two categories, two were already known to be established in the south of the island (Sooty-headed Bulbul, Java Sparrow) and another probably so (Zebra Dove), while one is established in central Sulawesi (Red-collared Dove). All are kept as cagebirds and it is likely that local escapes/releases were the source of these northern populations rather than northward spread (except perhaps in the case of the Red-collared Dove, whose northern record was closer to the central Sulawesi population). The discovery of the Sulphur-crested Cockatoos in Tangkoko is most likely to be the result of a deliberate release or escapes of pets or smuggled animals.

One introduced species, Yellow-vented Bulbul, is known to be established in the south of Sulawesi but not yet in the north. As this species most likely became established through cage escapes or releases it is feasible it could establish itself in the north through similar means. Elsewhere, in the Buton Islands in south Sulawesi, Catterall (1997) suggested another species, the Island Collared Dove *Streptopelia bitorquata*, could have also been introduced to Sumpu Island.

A lack of past records from Sulawesi (e.g. for much of the first seven decades of the twentieth century) may in part be due to a lack of visiting ornithologists and birdwatchers. However, even in recent times as north Sulawesi becomes increasing popular and accessible to birdwatchers, introduced species may be less recorded in 'trip reports' than native species, as they are often of less interest to birdwatchers, while birdwatching tours are more focused to finding native and particularly endemic species. Thus some of the species may be more common than current reports suggest. Further work is required to document the distribution, status and spread of introduced species in the north and other parts of Sulawesi—an imperative both from an economic and conservation perspective.

ACKNOWLEDGEMENTS

Thanks to John Tasirin, Iwan Hunowu, Nick Brickle, Filip Verbelen, Dave Farrow, Rob Hutchinson, Phil Gregory and the guides and rangers at Tangkoko Duasudara Nature Reserve for offering opinions and information on the identity of the cockatoo. Thanks to Guy Dutson, Jez Bird and an anonymous reviewer for comments on a draft and Stu Sheppard for provision of mapping data.

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